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# Math 195: Demystifying Mathematics

HOMWORK 1 : DUE JANUARY 31

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1. In Chapter 1 of Part 1, Orlin proposes some alternative rules for *Ultimate Tic-Tac-Toe* and in doing so, he changed the winning strategy. This question asks you to do the same for some other game. Pick some game you played at some point in your life. You can pick any game you'd like, but do consider that you will need to write about strategies, so be wary of particularly complicated games. Change one rule in the game and explore possible implications for strategies based on that rule change. Your first rule change may not be a particularly interesting one. If not, try a different rule change. Once you settle on one that is interesting, write a few paragraphs which explicitly address the following:
  - (a) Completely describe how to play the game. Assume you are explaining it to someone who has not played the game before.
  - (b) Discuss some different strategies for the game as traditionally played. These could be strategies to win, or strategies to force a draw, or other observations about “smart” ways to play the game.
  - (c) Carefully describe the rule change you settled on. Then explain how that rule change disrupted the strategies you discussed in (b), or what new strategies it led to.
2. On page 11 and 12, Orlin asks the reader to create pairs of rectangles with interesting properties: (1) one pair where the first rectangle has a bigger perimeter and the second rectangle a bigger area and (2) another pair where the first rectangle has a perimeter twice the perimeter of the second and the second rectangle has area twice the area of the first rectangle.

Spend some time trying to find a pair of rectangles that satisfies (1) and then a pair that satisfies (2).

Once you have a solution, write up *how* you found the solution. If you try several ideas and none of them produce an answer, pick the one strategy you think is most promising, and write carefully about that strategy.

I am aware that there are “answers” to these problems in the endnotes of the book. I will not be judging your responses on whether you successfully get the correct answer, but on how you explain your strategies and how “interesting” your solution attempts are if you do not completely solve it. So don't look at the endnotes!